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CHEMICAL & ENGINEERING NEWS

Fighting cancer with biological response modification
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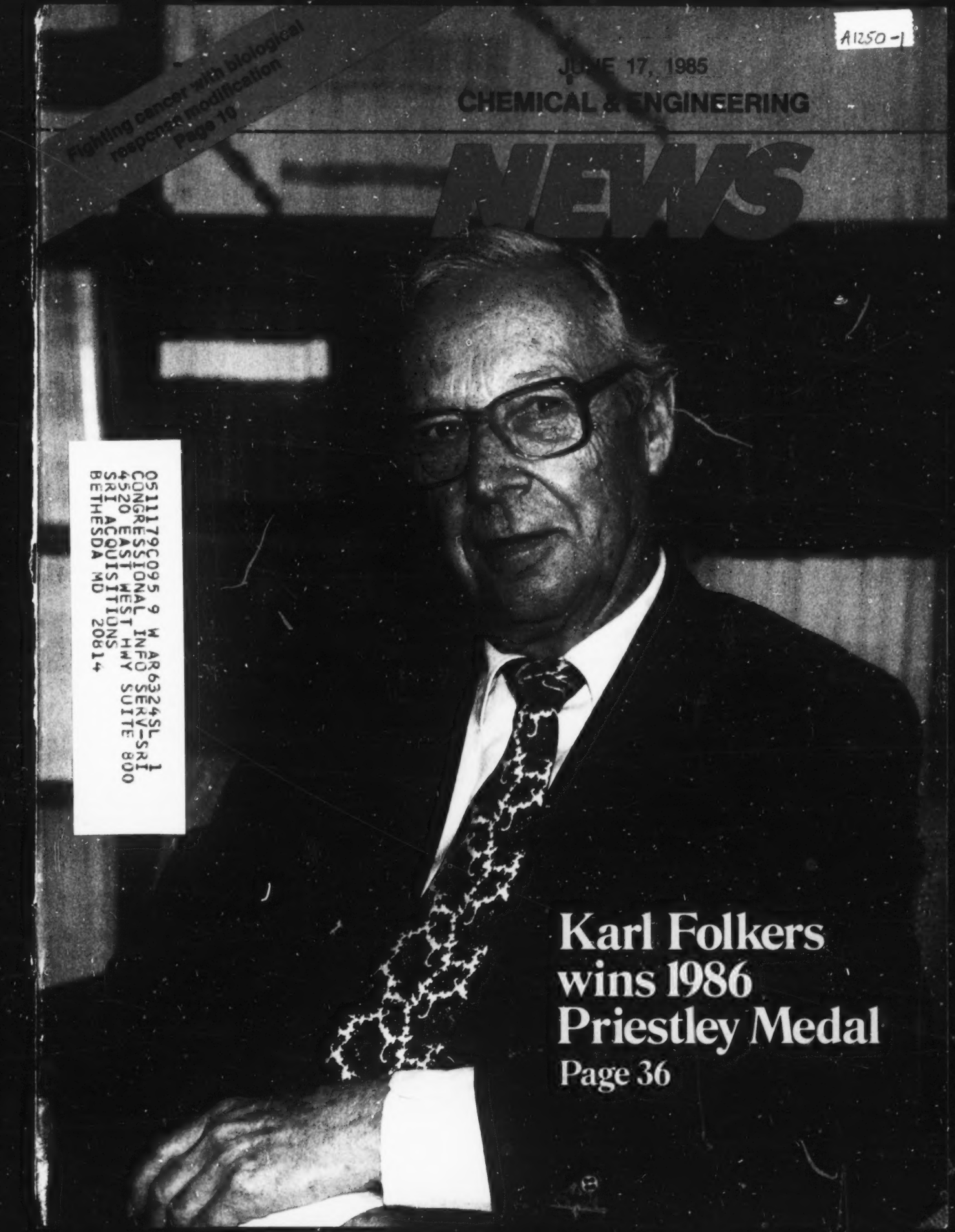

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Karl Folkers wins 1986 Priestley Medal

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CHEMICAL & ENGINEERING
NEWS

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News of the Week

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■ **Three scientists win GM Cancer Research Foundation prizes.** **Page 8**

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Priestley Medal

Karl Folkers, director of Institute for Biomedical Research at the University of Texas, wins 1986 ACS Priestley Medal. **Page 36**

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ACS News

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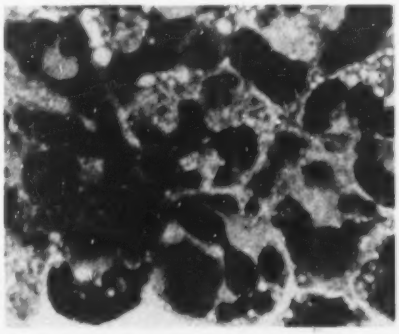

News Focus

Natural substances, such as interferons, that stimulate the body's immune system show promise for treating certain types of cancer. **Page 10**

SCIENTIFIC MANPOWER: Volume compiles data, maps trends

Chemists can expect a steady, if modest, growth in job openings in the next few years, with the balance between the supply of chemists available and the demand for their services staying about even, thus keeping unemployment low. That's the essence of one of the 50 or so statistical reports dealing with the supply and demand for scientists and engineers that have been distilled into the Scientific Manpower Commission's latest examination of scientific employment: "The Technological Marketplace."

Although all of the data have been published previously elsewhere, including some of it in C&EN, the report pulls together in one place most of the statistically based information on trends in technological employment over the past decade along with projections for what is expected in the next decade and a half. The report's data come from the National Science Foundation, other federal agencies, universities, professional societies, and private organizations concerned with the supply of and demand for scientists and engineers. The data are analyzed and trends are pointed out for fields such as chemistry and chemical engineering, and for science and engineering as a whole.

Two significant changes occurred in the 1970s in the supply of new graduates in science and engineering, says the report's author, Betty M. Vetter: Science and engineering degrees became a substantially smaller fraction of all degrees awarded, and the proportion of science and engineering degrees awarded to women rose steadily. The overall drop comes mostly at the doctoral level where the fraction of all degrees represented by science and engineering fell from 62% in 1960 to 50% in 1979. From 1973 to 1983 the actual number of science and engineering doctoral degrees fell 1%; at the same time, the number of these degrees awarded to women rose 98% as the number awarded to men fell 15%.

At the bachelor's level, a "remarkably consistent" 29 to 32% have majored in science or engineering over the past two decades, the report finds. From 1972 to 1982, the absolute number rose 6.1% (reflecting higher overall college enrollments during that period). The number of those degrees awarded to women rose 44%; the number awarded to men dropped 8.2%. By 1982, women accounted for 37% of the bachelor's degrees earned in science and engineering. As the future college age population decreases, the number of bachelor's degrees awarded in these fields is expected to drop steadily through 1998.

Similar trends may be seen in chemistry degrees over the period. Bachelor's degrees reached their peak levels in 1969 when 11,807 were awarded, 18% of which went to women. The number of graduates declined through 1973, to a minimum of 10,222, rose through 1979, and have been declining since then. In 1982, bachelor's degrees were earned by 11,062 students, 31% of whom were women. Doctoral degrees in chemistry peaked in 1970 at 2208 and have been rising since 1977 to reach 1722 in 1982. The proportion of women earning those degrees has risen steadily over the past 25 years, however, from 5% of the total in 1960 to 15% in 1980 and 1982.

Fortunately for chemistry graduates and other chemical professionals, current demand for chemists seems to be pretty much in balance with their supply, so that chemists experience a only a 1.7% imbalance between supply and demand, a condition that is expected to continue, at least for the next several years. Surveys of firms hiring chemists and chemical engineers find fewer than 5% report shortages in the availability of people in either of these fields. Where shortages exist, they are for experienced chemists and chemical engineers, not for recent graduates. Salary offers for recent graduates in both chemistry and chemical engineering remain high, however, suggesting that, although there are not serious shortages of these graduates, there are not surpluses either.

Copies of the report, "The Technological Marketplace: Supply and Demand for Scientists and Engineers," are available for $25 from the Scientific Manpower Commission, 1776 Massachusetts Ave., N.W., Washington, D.C. 20036. □

Chemists can expect slow, steady growth in jobs, continuing low unemployment rates

Thousands	1983 Total supply	1983 Demand	1983 % surplus	1987 Total supply	1987 Demand	1987 % surplus	% annual change
All scientists	566.2	523.0	7.7%	639.9	584.7	8.6%	4.1%
Chemists	95.5	93.9	1.7	104.6	102.8	1.7	2.5
All engineers	1217.2	1207.6	0.8	1437.3	1423.1	1.0	4.5
Chemical engineers	58.0	55.4	4.5	64.2	60.9	5.1	2.7

Source: National Science Foundation

U.S. Chemical Producers Weigh Antiapartheid Tack in South Africa

Companies believe they can do more good for blacks by continuing their operations there, but pressure to disinvest is increasing sharply

David Webber, C&EN New York

On the uneasy ground where concerns of profitability and moral responsibility meet, U.S. chemical companies with operations in South Africa are pondering their role in the fight to end apartheid.

Up to now, most of the 28 or so U.S. chemical and diversified chemical-oriented firms doing business there have approached the bitter issue under the philosophy that good jobs and nonworkplace philanthropy will improve conditions for nonwhites and contribute to a gradual end to the government's segregation policies. But this ameliorative approach—along which companies have generally found it possible to carry on business and simultaneously discharge what they consider their social responsibility—is now coming under increasingly strident attack from impatient antiapartheid groups, which want U.S. companies to withdraw from South Africa entirely.

Dozens of bills before Congress, state legislatures, and municipal bodies in the U.S. currently seek a variety of antiapartheid measures ranging from economic sanctions against South Africa to bans on further investment there to the divestiture by government pension funds of stocks of companies doing business there. In addition, highly publicized student protests—such as those at Columbia University and the University of California, Berkeley, this spring—have both increased the pressure on educational institutions to sell off their investments in companies operating in South Africa and heightened public awareness of the apartheid issue.

These tactics threaten companies, including chemical producers, operating in South Africa in several ways. A bill passed by the House this month [H.R. 1460, primary sponsor William H. Gray III (D.-Pa.)], would ban new investment, new bank loans, and computer exports to South Africa as well as bar the importation of South African gold coins. Most critical for U.S. businesses would be the ban on investment; companies would be unable to expand or modernize their facilities there. A narrower Senate bill, S. 995, authored by Foreign Relations Committee chairman Richard G. Lugar (R.-Ind.), has been approved by the Foreign Relations Committee.

The stock divestiture movement menaces chemical and other companies in a different way. Meant as a stick with which to drive U.S. companies into quitting South Africa, stock divestiture could mean, in its strongest possible form, the dumping of large blocks of a company's stock on the market. If executed over a brief period of time, such a maneuver undoubtedly would knock a stock's price down considerably. And for the chemical industry, the public image of which still bears the unattractive marks of Bhopal, agent orange, and Times Beach, further linking of the names of some of its members to a repugnant issue—whatever the qualifications—is undesirable.

The Sullivan principles: a code of conduct

Almost all U.S. chemical companies with operations in South Africa are signatories to the Sullivan principles, a code of conduct developed in 1977 by the Rev. Leon H. Sullivan, a Baptist minister in Philadelphia and a member of General Motors' board of directors. The code's intent is threefold: to promote racial equality in employment practices for U.S. firms operating in South Africa, to promote programs that can have a signficant impact on improving the living conditions and quality of life for the nonwhite population, and to be a major contributing factor in the end of apartheid. Starting with 12 original signatories, the list of firms that have signed the principles has grown to include now about half of the more than 300 U.S. firms with operations in South Africa. Adherence to the Sullivan principles requires:

- Nonsegregation of the races in all eating, comfort, and work facilities.
- Equal and fair employment practices for all employees.
- Equal pay for all employees doing equal or comparable work for the same period of time.
- Initiation and development of training programs that will prepare blacks, coloreds, and Asians—the three categories the South African government uses for nonwhites—in substantial numbers for supervisory, administrative, clerical, and technical jobs.
- Increasing the number of blacks, coloreds, and Asians in management and supervisory positions.
- Improving the quality of employees' lives outside the work environment in such areas as housing, transportation, schooling, recreation, and health facilities.

For the most part, chemical companies do not seem to have a tremendous amount to lose in South Africa if forced to disinvest, at least in relative terms. Assets held in that country tend to be relatively small. Nor are sales typically significant on the scale of total corporate revenues. Most U.S. chemical producers derive far less than 1% of global sales from their South African operations.

Companies say that they are not considering disinvestment. The explanation given by them for remaining in South Africa is nearly uniform and essentially twofold: They are in the business of making money for their shareholders and therefore continue to operate profitable concerns; and they believe their largely U.S.-standard jobs and financial assistance in the community offer nonwhites concrete help, whereas disinvestment, they say, would have no more than a symbolic impact on apartheid while penalizing those very blacks and other nonwhites whose lives have been improved through employment with the U.S. companies.

Both proponents and critics of the corporate rationale offer statistics in support of their views. Those calling for disinvestment point out that however good the U.S. firms' jobs are, they account for only a few per cent of South African employment. As a result, these critics say, only a proportionately small number of nonwhites are helped, but the economic activity brought to the nation strengthens the apartheid regime. For the good of the great bulk of the country's nonwhites, U.S. investment there should be dismantled, holds this point of view.

U.S. companies operating in South Africa, on the other hand, contend that the very fact that their activities account for such a small share of the South African economy—some $2.5 billion out of a gross national product of $90 billion—means their withdrawal would do little to loosen apartheid's grip on the country. If they were to cease business in protest of apartheid, they say, their operations probably would be either nationalized or bought by European or Japanese companies—none of which would be expected to maintain an equivalent level of social responsibility.

UPI Bettmann Newsphotos

Student protesters at Columbia call for divestiture of stock of U.S. companies operating in South Africa

And, even though the U.S. is South Africa's largest single trading partner, companies like to point out that the apartheid government is not without resources in the event of economic sanctions. In the early 1960s, for example, the United Nations imposed a boycott of arms sales to South Africa. The nation responded by building its own arms industry, and it is now a net exporter of weapons. Furthermore, the antidisinvestment party warns, South Africa is, except for the Soviet Union, the sole source of several militarily and industrially critical minerals. South Africa, antiapartheid hardliners are reminded, is potentially capable of implementing some painful boycotts of its own.

Companies concede that, at least as far as they are concerned, stock divestiture, if carried out on a broad scale, could have a deeper impact. How much, however, is hard to quantify at this point. There have been substantial divestitures involving chemical company stock, among others, in the past. Over the course of 1982, for example, the state of Massachusetts sold about $130 million worth of investments held by its public employee pension funds, including $3.4 million of Dow Chemical stock, $14.1 million of Du Pont stock, $1.1 million of Pfizer stock, and $2.5 million of Union Carbide stock. Since 1982, Connecticut has been selling stock of some companies.

Most firms say they have not been noticeably hurt by divestiture so far. At the most, some analysts say, even divestiture by major institutions could have an impact lasting no more than six to nine months. "The stock would be absorbed by other investors," comments Jack Henry, chemicals analyst at E. F. Hutton. "Long term, there would be no effect on stock prices and no effect on the operations of these companies." Remarks another observer: "It would be nothing more than the sale of stock by the conscience-stricken to the indifferent."

Still, antiapartheid sentiment in the U.S. seems to have reached a new high-water mark. Attempting to gauge the national mood, a recent *New York Times* editorial asserts that "the urge to punish South Africa for apartheid is now palpable throughout the U.S." For U.S. chemical companies, a number of which have had shareholder proposals calling for disinvestment included in recent annual meetings, reconsideration of the current approach may be inevitable.

Up to now, the majority of U.S. chemical companies operating in South Africa have dealt with the apartheid issue chiefly by following the Sullivan principles, a voluntary code of conduct drafted in 1977 by the Rev. Leon H. Sullivan, a Baptist minister in Philadelphia and a General Motors board member.

Chemical companies generally have rated in the fair to good categories in their adherence to the prin-

Most U.S. chemical firms get good rating on social responsibility in South Africa

Parent company	Types of operations	% 1984 sales from South Africa	Employment[a]			Signed Sullivan principles	Sullivan principles rating[b]
			Total	White	Nonwhite		
American Cyanamid	Mfg	1%	671	269	402	Yes	1,4
Dow Chemical	Sales, mfg	<1%	202	137	65	Yes	2,4
Du Pont	Sales	<1%	30	25	5	Yes	1
W. R. Grace	Sales, mfg	<1%	134	na	na	Yes	2
International Minerals	Mining	<1%	239	22	217	Yes	2,4
Monsanto	Sales	<1%	34	25	9	Yes	2
Nalco Chemical	Mfg	na	200	na	na	Yes	3
Olin	Sales, mfg	<1%	273	122	151	Yes	1,2,3
Rohm & Haas	Mfg	na	102	36	66	Yes	2,4
Union Carbide	Sales, mfg	<1%	1800	500	1300	Yes	1,2,4

a Figures are approximate. "Nonwhite" includes "blacks, coloreds, and Asians," the government categories for the nonwhite population. b 1) Making good progress; 2) Making progress; 3) Needs to become more active; 4) Companies with no more than 25 employees in South Africa or owning less than 50% of South African subsidiary. Multiple ratings reflect multiple subsidiaries. na = not available. **Source:** International Council for Equality of Opportunity Principles: "Eighth Report on the Signatory Companies to the Sullivan Principles (Oct. 1984)," communication with industry

ciples, according to annual audits of signatory companies by Arthur D. Little, Cambridge, Mass. In the October 1984 audit, for example, eight operations were ranked in category I (making good progress), 10 fell into category II (making progress), and three were placed in category III (needs to become more active). Other operations were mostly too small or were less than half-owned by the U.S. parents; as a result, they were not included in the three major categories.

The cost of a poor ranking, at least in terms of image, can be immediate. Last year, for instance, Nalco Chemical, which owns 50% of Anikem, a producer of water-treatment and other chemicals, was ranked in category III in the Sullivan principles audit for the fifth consecutive year. In response, the Iowa Episcopal Church, which held 400 shares of Nalco stock at the end of 1984, introduced a shareholder proposal at this March's annual shareholder meeting that the company either take whatever steps were necessary to achieve a higher rating in the October 1985 report or dispose of its South African operations as quickly as possible.

Nalco management responded that Anikem has made "considerable progress toward meeting the goals of those principles" and noted that, as a nonmajority stockholder, Nalco cannot dictate to Anikem and that divestment would deprive shareholders of their investment and Anikem of the example of "Nalco's leadership in fair employment practices."

Nalco's management also termed the Arthur D. Little classifications "subjective," reflecting widespread industry discomfort with the rating system, which ranks firms in comparison to each other rather than on an absolute scale. Nalco declares that its low rating does not mean that Anikem was not active in supporting the Sullivan principles, but that it was not so active as some other companies. The proposal was defeated.

Even the most active supporters of the Sullivan principles, however, cannot satisfy the intent of Sullivan's initiative by mere maintenance of previous achievements. That code is frequently revised. The "Fourth Amplification," drafted last November, requires the companies to support actively the freedom of blacks to work or live where they choose—freedoms currently curtailed by South African laws—and to support the ending of all apartheid laws.

Although chemical company signatories say they intend to support the new aspects of the principles, this increased focus on bringing about change outside the workplace makes their position more delicate. As companies operating in South Africa, they point out, they cannot break laws. Nor, they say, can they afford to be overtly abrasive toward the Pretoria government if they expect to continue to do business there and effect gradual gains.

"We don't adopt a confrontational kind of attitude," says Ned Brandt of Dow. "We don't make speeches about how terrible they are. We talk to them privately. That is much more effective, particularly respecting the Afrikaner mentality."

In addition, most U.S. companies in South Africa participate in the American Chamber of Commerce in South Africa, which, as an umbrella organization, has been urging the Pretoria government to eliminate a number of the strictures of apartheid. In March, for instance, the group submitted a set of proposals to a special cabinet committee under the chairmanship of the Minister of Constitutional Development & Planning. The proposals included the phasing out of geographical restrictions on blacks, the granting of freehold rights for urban blacks, the end of population removals, the end of the current migratory labor system (which bars blacks from bringing their families with them), the opening of central business districts to all races, and an end to the transfer of black citizenship from South Africa to homelands.

Nonetheless, the idea of discourse and gradual improvement as an answer to the apartheid issue is now losing currency among some of its strongest supporters in the U.S. Bills now under consideration in Congress reflect a belief among Representatives and Senators that the Administration's policy of "constructive engagement" with South Africa has failed. Even Sullivan now says that he thinks the Sullivan principles, along with other forces, should have two more years in which to try to end apartheid. If unsuccessful during that period, he says, the U.S. should impose a total economic embargo against South Africa and all U.S. firms there should withdraw.

At present, U.S. chemical companies in South Africa continue to operate as usual. Citing business reasons, they say for the most part that no new investment is planned in their operations there. They cannot be sure what to expect from Congress or Pretoria. What they can expect, it seems safe to say, is an increasingly emotional environment in which to press their arguments of gradual change. □